

NASA'S SPACEFLIGHT VISUAL IMPAIRMENT & INTRACRANIAL HYPERTENSION RESEARCH PLAN: AN ACCELERATED RESEARCH COLLABORATION. C. Otto, J. Fogarty, D. Grounds & J. Davis

To date six long duration astronauts have experienced in flight visual changes and post flight signs of optic disc edema, globe flattening, choroidal folds, hyperoptic shifts and or raised intracranial pressure. In some cases the changes were transient while in others they are persistent with varying degrees of visual impairment. Given that all astronauts exposed to microgravity experience a cephalad fluid shift, and that both symptomatic and asymptomatic patients have exhibited optic nerve sheath edema on MRI, there is a high probability that all astronauts develop in-flight idiopathic intracranial hypertension to some degree. Those who are susceptible, have an increased likelihood of developing treatment resistant papilledema resulting in visual impairment and possible long-term vision loss. Such an acquired disability would have a profound mission impact and would be detrimental to the long term health of the astronaut.

The visual impairment and increased intracranial pressure phenomenon appears to have multiple contributing factors. Consequently, the working "physiological fault bush" with elevated intracranial pressure at its center, is divided into ocular effects, and CNS and other effects. Some of these variables have been documented and or measured through operational data gathering, while others are unknown, undocumented and or hypothetical. Both the complexity of the problem and the urgency to find a solution require that a unique, non-traditional research model be employed such as the Accelerated Research Collaboration<sup>TM</sup> (ARC) model that has been pioneered by the Myelin Repair Foundation. In the ARC model a single entity facilitates and manages all aspects of the basic, translational, and clinical research, providing expert oversight for both scientific and managerial efforts. The result is a comprehensive research plan executed by a multidisciplinary team and the elimination of stove-piped research. The ARC model emphasizes efficient and effective communication between management and investigators; and real-time sharing of scientific discoveries in an effort to solve complex problems.